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Basic Filing Fee				\$690.00
Total Claims				
19	20	0	x 18.00	\$0.00
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3	3	0	x 78.00	\$0.00
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CORDLESS POWER TOOL BATTERY RELEASE MECHANISM

CLAIM FOR PRIORITY UNDER 35 U.S.C. § 120

5 This application is a continuation-in-part and claims priority under 35 U.S.C. §120 to U.S. Patent Application Serial No. 29/105,748, filed June 1, 1999, entitled "BATTERY POWERED DRILL/DRIVER," the entire disclosure of which is hereby incorporated by reference.

TECHNICAL FIELD

10 The present invention relates to cordless power tools, and more particularly, to cordless power tools having a battery release mechanism for releasably securing a battery to the power tool.

BACKGROUND

15 Cordless power tools are well-known and provide several advantages over traditional corded power tools. One of the advantages provided by cordless power tools is the mobility and/or portability when using the tool. For example, the operator of the cordless power tool can quickly and efficiently work over a larger area without having to continually adjust the power cord. Similarly, cordless power tools can be used in areas where electrical power is not available. Because of these advantages, the popularity of cordless power tools has increased among both professional and novice power tool users.

20 Despite these advantages, there are disadvantages associated with cordless power tools. One of the disadvantages associated with cordless power tools is the power limitations of the battery pack. Typically, most battery packs for cordless power tools can be operated between about 4 to 8 hours depending on the size of the battery and the amount of usage. Once the electrical charge in the battery is depleted, the operator typically is required to remove the battery pack from the power tool and recharge the battery using a battery charger.

Many existing power tools include battery release mechanisms that allow the battery to be removed from the power tool and recharged. Existing battery release mechanisms include latching arrangements that releasably secure the battery pack to the power tool. For example, some existing release mechanisms include two push buttons
5 disposed on the side of the battery housing. In these arrangements, the battery pack extends upwards into the handle of the power tool. Thus, in order to remove the battery pack from the power tool, the user depresses both buttons and pulls downward on the battery pack to disengage the battery pack from the power tool. Other battery release mechanisms have a button disposed through the rear of the power tool. The user can
10 release the battery pack from the power tool by depressing or sliding the button such that the latching arrangement allows removal of the battery pack.

However, there are several shortcomings with existing battery release mechanisms. For example, release mechanisms that have two buttons typically require the operator to hold the power tool and depress both buttons while trying to remove the
15 battery pack from the power tool. Without depressing both release buttons, the battery pack is unable to be removed from the power tool. Moreover, release mechanisms having the release button disposed through the rear of the power tool typically require the operator to hold the tool differently from the way the power tool is held during operation in order to remove the battery. As a result, these battery release mechanisms
20 are often cumbersome and difficult to use.

Improvements in the mechanisms used to releasably secure battery packs to cordless power tools are sought.

SUMMARY OF THE DISCLOSURE

The present disclosure generally relates to cordless power tools. More
25 particularly, the present disclosure is directed towards cordless power tools having a battery release mechanism for releasably securing a battery to the power tool. The battery engages a closure member as the battery is forced into engagement with the tool from the rear.

One aspect of the invention relates to a cordless power tool having a
30 main body portion, a handle portion depending from the main body portion and a

mechanism for releasably securing a battery to the handle portion opposite the main body portion. The mechanism for releasably securing the battery to the handle portion includes a battery receiving portion integral with the handle portion and an attachment portion integral with the battery. The attachment portion is configured to engage the battery receiving portion. The mechanism also includes a closure member that is operable with and transversely disposed within the battery receiving portion. The closure member is configured to secure the battery within the battery receiving portion when the closure member is in a "lock" position. The closure member has a first end and a second end opposite the first end. The first end is disposed through a side wall of the tool housing and defines a push button for selectively moving the closure member from the "lock" position to a "release" position. When the closure member is in the "release" position, the battery can be removed from the power tool.

In yet another aspect of the invention, the closure member also includes a locking finger integral with the second end of the closure member. The locking finger is configured to secure the battery within the battery receiving portion when the closure member is in the "lock" position. Furthermore, the battery receiving portion includes a first guide channel and a second guide channel. Similarly, the attachment portion includes a first guide rail and a second guide rail. The first and second guide rails are configured to interlock with the first and second guide channels.

In an alternative aspect of the invention, the mechanism for releasably securing a battery to a power tool includes a battery receiving portion integral with the power tool housing. The battery receiving portion includes a mounting surface for receiving the battery and an attachment portion integral with the battery. The attachment portion is configured to slidably engage the battery receiving portion. Furthermore, the mechanism for releasably securing the battery to the power tool also includes a closure member that is operable with and arranged substantially perpendicular to the battery receiving portion. The closure member is configured to secure the battery within the battery receiving portion when the closure member is in a "lock" position. Conversely, the closure member is configured to disengage the battery when the closure member is in a "release" position. In this aspect of the disclosure, the closure member includes a first end and a second end opposite the first end. The closure

member has an elongated body portion and a locking finger that is integral with and extends from the body portion substantially near the second end of the closure member. The locking finger is configured to secure the attachment portion to the power tool when the battery is positioned within the battery receiving portion.

5 In another aspect, the first end of the locking finger is disposed through a side wall of the tool housing and defines a push button for selectively moving the closure member from the “lock” position to the “release” position. The battery receiving portion includes a first guide channel and a second guide channel. Similarly, the attachment portion includes a first guide rail and a second guide rail. The first and
10 second guide rails are configured to interlock with the first and second guide channels. The first guide rail has a first end for engaging the locking finger when the battery is moved in a first direction relative to the attachment portion. The first guide rail has a second end for engaging the locking finger when the battery is moved in a second direction relative to the attachment portion.

15 A method for releasably securing a battery to a power tool housing is also disclose. The method includes the steps of providing a power tool having a battery receiving portion integral with the power tool housing. The battery receiving portion is operable with a closure member that is transversely disposed within the battery receiving portion and configured to secure the battery within the battery receiving
20 portion. The closure member has a first end and a second end. The first end of the closure member is disposed through a side wall of the tool housing and defines a push button for selectively moving the closure member from a “lock” position to a “release” position. On the battery, an attachment portion is provided that is integral with the battery and is further constructed to engage the battery receiving portion. The method
25 further includes the steps of aligning the attachment portion with the battery receiving portion and moving the battery in a first direction such that the attachment portion slidably engages the battery receiving portion and the closure member such that the closure member is urged into the “release” position. To releasably secure the battery to power tool, the battery is positioned within the battery receiving such that the closure
30 member returns to the “lock” position. Preferably, the attachment portion slidably engages the battery receiving portion from the rear of the power tool.

The above summary of the present invention is not intended to describe each illustrated embodiment or every implementation of the present invention. Other objects, features and advantages of the present invention will become more apparent in light of the following detailed description of exemplary embodiments thereof, as
5 illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention may be more completely understood in consideration of the following detailed description of various embodiments of the invention in connection with the accompanying drawings, in which:

10 FIG. 1 is a perspective view illustrating a power tool having a battery pack secured thereto according to the principles of the present disclosure;

FIG. 2 is a side-elevational view illustrating a first side of the power tool shown in FIG. 1;

FIG. 3 is a side-elevational view illustrating a second side of the power
15 tool shown in FIG. 1 opposite the first side of the power tool shown in FIG. 2;

FIG. 4 is a side-elevational view illustrating the front of the power tool shown in FIGS. 1-3;

FIG. 5 is a side-elevational view illustrating the rear of the power tool shown in FIGS. 1-4;

20 FIG. 6 is a side-elevational view illustrating the battery receiving portion from the rear of the power tool shown in FIG. 5;

FIG. 7A is a plan view of the bottom of the power tool shown in FIG. 1 -
5 illustrating a battery release mechanism in a "lock" position;

FIG. 7B is a plan view of the bottom of the power tool shown in FIG. 1
25 illustrating the battery release mechanism in a "release" position;

FIG. 8 is a plan view of a closure member for use with the battery release mechanism of the present disclosure;

FIG. 9 is a side-elevational view of the closure member shown in FIG. 8;

FIG. 10 is a plan view of the top of a battery pack illustrating the battering receiving portion according to the principles of the present disclosure;

FIG. 11 is a side-elevational view of the battery pack shown in FIG. 10;

FIG. 12 is an exploded, side-elevational view of the power tool shown in
5 FIGS. 1–5 illustrating a battery in slidable engagement with the power tool; and

FIGS. 13A, 13B, and 13C are cross-sectional views of the power tool of
FIG. 3 taken along line 13–13 illustrating engagement of the battery of FIGS. 10 and 11
with the power tool of FIGS. 1–5.

While the invention is amenable to various modifications and alternative
10 forms, specifics thereof have been shown by way of example in the drawings and will
be described in detail. It should be understood, however, that the intention is not to
limit the invention to the particular embodiments described. On the contrary, the
intention is to cover all modifications, equivalents, and alternatives falling within the
spirit and scope of the invention as defined by the appended claims.

15 DETAILED DESCRIPTION

The present disclosure generally relates to cordless power tools. More
particularly, the present disclosure is directed towards cordless power tools having a
battery release mechanism for releasably securing a battery to the power tool. While the
present invention is not so limited, a more detailed understanding of the present
20 invention will be gained through a discussion of the drawings in connection with the
examples provided below.

Referring now to FIG. 1, there is illustrated a cordless electric power tool
100. By way of illustration, the power tool 100 shown in FIG. 1 is an electric power
drill/driver. However, it should be understood that the present invention is generally
25 applicable to a variety of power tools, including cordless circular saws, cordless
reciprocating saws, planars, flashlights, as well as other cordless tools having a
rechargeable battery pack secured thereto.

The power tool 100 has a housing 102 that is preferably molded from a
suitable plastic material, such as polyethylene, polypropylene, or polyurethane. In a
30 preferred embodiment, the power tool housing 102 is injection molded having two

halves portions **102A**, **102B**. The two halve portions **102A**, **102B** are secured together in a conventional manner using mechanical fasteners (not shown), such as screws. The tool housing **102** includes a generally tubular and elongated main body portion **103**. An electric motor (not shown) is disposed within the body portion **103**. The electric motor is electrically coupled to a battery pack **108** that provides the electrical energy to power the electric motor. Furthermore, the electric motor is mechanically coupled to an output shaft **105** that can be configured to operate with various tool accessories. For example, the output shaft **105** is a conventional drill chuck that can be configured to operate with tool accessories, such as, drill bits, drivers, or other accessories.

The tool housing **102** also includes a handle portion **104** that extends downwardly from the main body portion **103**. By “downwardly,” it is meant that in the orientation of the power tool **100** shown in FIG. 1, the handle portion **104** extends below the main body portion **103** of the power tool **100**. The handle portion **104** is configured and arranged to allow a user to easily grip and maneuver the power tool **100** during operation. As shown in FIGS. 2 – 5, the handle portion **104** includes a first side region **111A**, a second side region **111B** opposite the first side region **111A**. Additionally, the handle portion **104** includes a front region **113A** connecting the first and second side regions **111A**, **111B** along the front of the power tool, and a rear region **113B** connecting the first and second side regions **111A**, **111B** along the rear of the power tool **100**. In the embodiment shown in FIGS. 2 – 5, the first side region **111A** is the “right-hand” side of the handle portion **104** and the second side region **111B** is the “left-hand” side of the handle portion **104**.

The power tool housing **102** also defines a trigger receiving portion **109** disposed between the main body portion **103** and the handle portion **104**. More particularly, the trigger receiving portion **109** is disposed between the main body portion **103** and the front region **113A**. The trigger receiving portion **109** is sized and configured to allow the operator to engage a trigger **107** disposed through the trigger receiving portion **109**. Moreover, the trigger receiving portion **109** defines a ridge **112** that separates the trigger receiving portion **109** from the handle portion **104**. The ridge **112** assists the operator in properly aligning his hand on the handle portion **104** when

operating the power tool **100**. For example, when the operator is gripping the power tool **100**, the operator typically uses his trigger finger (eg. the operator's forefinger) to actuate the trigger **107**. While the operator's trigger finger is positioned over the trigger receiving portion **109**, the ridge **112** ensures that the operator's other fingers are
5 positioned below the trigger **107** and are, therefore, unable to actuate the trigger **107**.

Referring again to FIG. 1, the power tool **100** also includes a support portion **106** that is integral with the handle portion **104**. The support portion **106** is generally flat and elongated and extends in a direction substantially parallel to the elongated main body portion **103**. The support portion **106** stabilizes the power tool
10 **100** when resting on a flat surface in an upright position as shown in FIG. 1. As will be described in greater detail below, a battery pack **108** is releasably secured to the support portion **106** of the power tool **100**. In one embodiment, the battery **108** can be released from the power tool **100** by depressing the button **110** which is disposed through a side of the handle portion **104**.

Referring now to FIG. 6, a side elevational view illustrating the rear of the power tool **100** is shown. As can be seen, the support portion **106** depends from and is integral with the handle portion **104**. The support portion **106** includes a battery receiving portion **112**. The battery receiving portion **112** is sized and configured to slidably receive the battery **108** (FIG. 1) through the opening **114**. The battery receiving
20 portion **112** is capable of accommodating any size battery **108** that is capable of operating the cordless power tool **100**. For example, the battery **108** can be a 12 volt, 14.4 volt or a 19.2 volt battery or any other size battery capable of operating the cordless power tool **100**. The battery receiving portion **112** includes a first guide channel **116** and a second guide channel **119**. The first guide channel **116** is generally "L-shaped" and includes an upright member **117** depending from the mounting surface **115**. A
25 flange member **118** extends laterally from and substantially perpendicular to the upright member **117**. Similarly, the second guide member **119** is also generally "L-shaped" and includes an upright member **120** depending from and substantially perpendicular to the mounting surface **115**. A flange member **121** extends laterally from and substantially
30 perpendicular to the upright member **120**. Additionally, electrical terminals or contacts

122 depend from the mounting surface 115 and are disposed within the battery receiving portion 112. Preferably, the electrical terminals or contacts 122 are substantially centered between the first and second guide channels 116, 119. The electrical terminals 122 are situated to engage the battery terminals 162 integral with the battery 108 discussed below in connection with FIGS. 10 and 11.

Referring now to FIG. 7A, a bottom plan view of the power tool 100 is shown illustrating the battery release mechanism according to the principles of the present disclosure. As can be seen, the first guide channel 116 is substantially parallel to the second guide channel 119. Further, the first and second guide channels 116, 119 are situated along the length of the mounting surface 115 and are spaced apart a lateral distance. As discussed above, the first and second guide channels 116, 119 are constructed and arranged to receive the battery 108 (FIG. 1).

The battery release mechanism includes a generally elongated closure member 130 that is situated within the battery receiving portion 112 substantially perpendicular to the first and second guide channels 116, 119. As shown in FIGS. 8 and 9, the closure member 130 has a first end 132 and a second end 134. The first end 132 is disposed through a side wall of the power tool housing 100 and defines a push button 110 that allows a user to selectively move the closure member 130 from a “lock” position to a “release” position. In one embodiment, the push button 110 is disposed through the first side region 111A of the handle portion 104. Alternatively, the push button 110 can be disposed through the second side region 111B of the handle portion 104. Thus, an operator can easily and efficiently release the battery 108 from the power tool 100 by depressing a single button 110 disposed through a side region of the power tool 100.

Additionally, as shown in FIG. 9, the elongated closure member 130 also includes a locking finger 136 at or substantially near the second end 134. The locking finger 136 is constructed and arranged to selectively obstruct the first guide channel 116. As shown in FIG. 8, the locking finger 136 includes an angled or chamfered surface 138 and a rear edge surface 139 that converge at the tip 137. In one embodiment, the locking finger 136 obstructs at least a portion of the first guide rail 116

when the closure member **130** is disposed within the battery receiving portion **112** and in the “lock” position. By “obstruct,” it is meant that the tip **137** of the locking finger **136** extends beyond the upright member **117** of the first guide rail **116**. In the embodiment shown in FIG. **6**, the tip **137** of the locking finger **136** is substantially coplanar with the tip **118A** of the laterally extending flange member **118**. Conversely, when the closure member **130** is in the “release” position as shown in FIG. **7B**, the locking finger **136** no longer obstructs the first guide channel **116**. Instead, the tip **137** of the locking finger **136** is substantially coplanar with the upright member **117**. In the embodiment shown in FIG. **7B**, the tip **137** of the locking finger **136** is substantially coplanar with the upright member **117**.

A post **135** extends from a lower portion **133** of the closure member **130** as shown in FIGS. **7A**, **7B**, and **8**. The post **135** is sized and configured to receive a spring **125**, such as a helical coil compression spring. The spring **125** biases the closure member **130** in the “lock” position. For example, when the closure member **130** is disposed within the battery receiving portion **112**, the spring **125** biases the closure member **130** into the “lock” position such that the locking finger **136** obstructs at least a portion of the first guide channel **116** as discussed above. Conversely, when the push button **110** is depressed, the spring **125** is compressed as the closure member **130** is moved from the “lock” position to the “release” position.

As discussed above, the battery receiving portion **112** is constructed and arranged to receive and secure the battery **108** within the battery receiving portion **112**. Referring now to FIGS. **10** and **11**, the battery **108** includes a main body portion **150**. The main body portion **150** has a flat bottom surface **150A** that allows the power tool **100** to remain in an upright position as shown in FIG. **1** when the battery **108** is secured to the power tool **100**.

An attachment portion **151** opposite the bottom surface **150A** is provided to engage with the battery receiving portion **112** of the power tool **100**. In a preferred embodiment, the attachment portion **151** is substantially centered on the attachment surface **158**. The attachment portion **151** includes a first guide rail **152** and a second guide rail **155**. The first guide rail **152** is a generally “L-shaped” and includes an

upright member **153** extending upwards and substantially perpendicular from the attachment surface **158** and opposite the bottom surface **150A**. A flange member **154** extends laterally from and substantially perpendicular to the upright member **153**. The second guide rail **155** is also generally “L-shaped” and also includes an upright member **156** extending upwards and substantially perpendicular from the attachment surface **158** and opposite the bottom surface **150A**. A flange member **157** extends laterally from and substantially perpendicular to the upright member **156**. A rear edge **164** extends between and connects the first and second guide rails **152, 155**.

The first and second guide rails **152, 155** are constructed and arranged to engage and interlock with the first and second guide channels **116, 119**, respectively. By “interlock,” it is meant that the first and second guide rails **152, 155** cooperate with the first and second guide channels **116, 119** to allow the battery **108** to slidably engage with the power tool **100**. To facilitate this, the flange member **154** of the first guide rail **152** has a chamfered or beveled leading edge **154A**. Similarly, the flange member **157** of the second guide rail **155** has a chamfered or beveled leading edge **157A**. The chamfered or beveled leading edges **154A, 157A** allows easier alignment and interlocking between the first and second guide rails **152, 155** and the first and second guide channels **116, 119**.

The battery terminals **162** are disposed within the attachment portion **151** of the battery **108**. The battery terminals **162** are electrically coupled to the battery cells **159** disposed within the main body portion **150** of the battery **108**. The battery terminals **162** are constructed and arranged to engage the battery contacts **122** disposed within the battery receiving portion **112**. Accordingly, electrical communication is provided between the battery terminals **162** and the battery contacts **122** when the battery **108** is releasably secured to the power tool **100** according to the present disclosure. Furthermore, the battery **108** also includes a sealing member **166** that seals the opening **114** once the battery **108** is releasably secured to the power tool **100**.

In operation, the battery **108** can be releasably secured to the power tool **100** by bringing the attachment portion **151** of the battery **108** into engagement with the battery receiving portion **112** of the power tool **100**. Preferably, as shown in FIG. **12** the

battery **108** is brought into engagement with the power tool **100** from the rear. This is accomplished by first aligning the attachment portion **151** with the opening **114** of the battery receiving portion **112**. As shown in FIG. **13A**, after aligning the attachment portion **151** with the battery receiving portion **112**, the battery **108** can be slid into the tool housing **102** such that the first guide rail **152** engages the first guide channel **116** and the second guide rail **155** engages the second guide channel **119**. For example, FIG. **13A** shows the battery receiving portion **112** and the attachment portion **154A** in initial engagement. Thus, the leading edge **154A** is in physical engagement with the locking finger **136** that obstructs at least a portion of the first guide channel **116**.

As the attachment portion **151** is slid into engagement with the battery receiving portion **112**, the first and second guide rails **152**, **155** are allowed to interlock with the first and second guide channels **116**, **119**. As discussed above, the closure member **130** is biased into the “lock” position such that the locking finger **136** obstructs at least a portion of the first guide channel **116**. However, as shown in FIG. **13B**, as the battery **108** is slidably moved into engagement with the battery receiving portion **112**, the first guide rail **152** engages the closure member **130** and urges the closure member **130** into the “release” position. For example, the first guide rail **152** urges the locking finger **136** out of the first guide channel **116** such that the tip **137** is substantially coplanar with the upright member **117** of the first guide channel **116**. In a preferred embodiment, the flange member **153** of the first guide rail **152** has a chamfered leading edge **153A** that engages the angled or chamfered surface **138** of the locking finger **136** as the first guide rail **152** slidably engages the first guide channel **116**. Accordingly, the resistance of the locking finger **136** to be moved from the guide channel **116** is reduced. The battery **108** is moved further into the battery receiving portion **112** until the rear edge **164** of the attachment portion **151** moves beyond the rear edge **139** of the locking finger **136** as shown in FIG. **13C**. In this position, the first guide rail **152** no longer urges the locking finger out of the first guide channel **116** and therefore, the closure member **130** is allowed to return to the “lock” position. In this position, the battery **108** is secured to the power tool **100**.

An operator can release the battery **108** from the power tool **100** by depressing the push button **110** and urging the battery **108** in a direction towards the rear of the power tool **100**. Preferably, the push button **110** is disposed through the side of the power tool housing **102** and can be depressed by the operator using the same hand that urges the battery **108** away from the power tool **100**. By depressing the push button **110**, the closure member **130** is urged from the “lock” position to the “release” position. In the “release” position, the locking finger **136** of the closure member **130** no longer obstructs the first guide channel **116**. Thus, the rear edge **164** of the attachment portion **151** no longer prevented from movement by the rear edge **139** of the locking finger **136**.
10 As a result, the battery **108** can be easily removed from the battery receiving portion **112** of the power tool **100** by depressing a single button **110** disposed through a side region of the power tool **100** and pulling the battery **108** from the power tool **100**.

The operator can maintain a firm grip on the handle portion **104** with a first hand while gripping the battery **108** and depressing the push button **110** with a second hand. Preferably, the first hand of the operator grips the handle portion **104** of the power tool **100** similar to the way the power tool **100** is held during operation. A second hand of the operator grips the battery while depressing the button **110** and pulling the battery **108** from the power tool **100**. Alternatively, the operator can depress the button **110** with a finger of the first hand holding the handle portion **104** while pulling the battery **108** from the power tool **100**. In either case, the operator can easily and efficiently remove the battery **108** from the power tool **100**.
15
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The above specification and embodiments are believed to provide a complete description of the manufacturer and use of particular embodiments of the invention. Many embodiments of the invention can be made without departing from the spirit and scope of the invention, which is limited by the attached claims.
25

WE CLAIM:

1. A cordless power tool comprising:
 - (a) a main body portion;
 - (b) a handle portion depending from the main body portion; and
 - (c) a mechanism for releasably securing a battery having battery terminals to the handle portion opposite the main body portion, the mechanism including:
 - (i) a battery receiving portion integral with the handle portion, the battery receiving portion having battery contacts disposed therein;
 - (ii) an attachment portion integral with the battery, the attachment portion being constructed and arranged for engaging the battery receiving portion such that the battery terminals engage the battery contacts;
 - (iii) a closure member operable with and transversely disposed within the battery receiving portion and configured to secure the battery within the battery receiving portion, the closure member having a lock position and a release position, the closure member including:
 - (i) first and second opposite ends, the first end being disposed through a side wall of the tool housing and defining a push button for selectively moving the closure member from the lock position to the release position, thereby allowing the battery to be easily removed from the power tool.
2. The power tool of claim 1, the closure member further comprising a locking finger integral with the second end, the locking finger being constructed and arranged for securing the battery within the battery receiving portion when the closure member is in the lock position.
3. The power tool of claim 1, wherein:
 - (a) the battery receiving portion includes first and second guide channels;and

4. The power tool of claim 3, the closure member further comprising a locking finger integral with the second end, the locking finger being constructed and arranged for securing the guide rails within the guide channels when the battery is positioned within the battery receiving portion and the closure member is in the lock position.

5. The power tool of claim 4, wherein the locking finger has a chamfered surface constructed and arranged to engage with the first guide rail of the attachment portion such that the closure mechanism is moved to the release position.

6. The power tool of claim 4, wherein the locking finger obstructs at least a portion of the first guide channel when the closure member is in the lock position.

7. The power tool of claim 4, wherein the locking finger is removed from the first guide channel when the closure member is in the release position.

8. The power tool of claim 1, wherein the closure member is spring biased in the lock position.

9. The power tool of claim 1, wherein the attachment portion slidably engages the battery receiving portion from the rear of the power tool.

10. A mechanism for releasably securing a battery having battery terminals to a power tool housing, the mechanism comprising:

- (a) a battery receiving portion integral with the power tool housing, the battery receiving portion having battery contacts disposed therein and further having a mounting surface for receiving a battery;
- (b) an attachment portion integral with the battery, the attachment portion constructed and arranged for engaging the battery receiving portion such that the battery terminals engage the battery contacts;
- (c) a closure member operable with and arranged substantially perpendicular to the battery receiving portion and configured to secure the battery

within the battery receiving portion when the closure member is in a lock position and disengage the battery when the closure member is in a release position, the closure member including:

- (i) first and second opposite ends;
- (ii) an elongated body portion;
- (iii) a locking finger integral with and extending from the body portion substantially near the second end of the closure member, the locking finger being constructed and arranged for securing the attachment portion when the battery is positioned within the battery receiving portion.

11. The mechanism of claim 10, wherein the first end of the closure member is disposed through a side wall of the tool housing and defines a push button for selectively moving the closure member from the lock position to the release position.

12. The mechanism of claim 10, wherein

- (a) the battery receiving portion includes first and second guide channels having an upright member extending from the mounting surface and a flange member extending substantially perpendicular from the distal end of the upright member; and
- (b) the attachment portion comprises first and second guide rails being constructed and arranged for interlocking with the first and second guide channels, the guide rails having a first end for engaging the locking finger when the battery is moved in a first direction relative to the attachment portion, and a second end for engaging the locking finger when the battery is moved in a second direction relative to the attachment portion.

13. The mechanism of claim 12, wherein the locking finger includes a chamfered surface constructed and arranged to engage with the first guide rail of the attachment portion such that the closure mechanism is moved to the release position.

14. The mechanism of claim 13, wherein the locking finger further includes an occluding surface opposite the chamfered surface, the occluding surface being

constructed and arranged to obstruct at least a portion of the first guide channel when the closure member is in the lock position.

15. A method of releasably securing a battery to a power tool housing, the method comprising the steps of:

- (a) providing a battery receiving portion integral with the tool housing, the battery receiving portion being operable with a closure member transversely disposed within the battery receiving portion and configured to secure the battery within the battery receiving portion, the closure member having:
 - (i) first and second opposite ends, the first end being disposed through a side wall of the tool housing and defining a push button for selectively moving the closure member from a lock position to a release position;
- (b) providing an attachment portion integral with the battery, the attachment portion being constructed and arranged for engaging the battery receiving portion;
- (c) aligning the attachment portion with the battery receiving portion;
- (d) moving the battery in a first direction such that the attachment portion slidably engages the battery receiving portion and the closure member such that the closure member is urged into the release position; and
- (e) positioning the battery within the battery receiving portion such that the closure member returns to the lock position, thereby securing the battery to the power tool.

16. The method of claim 15, wherein:

- (a) the step of providing a battery receiving portion integral with the tool housing includes providing a battery receiving portion having first and second guide channels;
- (b) the step of providing an attachment portion integral with the battery includes providing an attachment portion having first and second guide rails being constructed and arranged for interlocking with the first and second guide channels; and

- (c) the step of aligning the attachment portion with the battery receiving portion further includes aligning the first and second guide rails with the first and second guide channels.
17. The method of claim 16, wherein:
- (a) the step of providing a battery receiving portion operable with a closure member includes providing a closure member having a locking finger integral with the second end of the closure member; and
 - (b) the step of moving the battery in a first direction further includes moving the battery in a first direction such that the first and second guide rails slidably engage the first and second guide channels and the locking finger such that the closure member is urged into the release position.
18. The method of claim 15, the method further comprising the step of:
- (a) depressing the push button such that the closure member moves from the lock position to the release position; and
 - (b) moving the battery in a second direction such that the attachment portion disengages from the battery receiving portion.
19. The method of claim 15, wherein:
- (a) the step of moving the battery in a first direction includes moving the battery in a first direction such that the attachment portion slidably engages the battery receiving portion from the rear of the power tool.

Abstract

A battery release mechanism for releasably securing a battery to a power tool is disclosed. The battery release mechanism includes a battery receiving portion integral with a handle portion of the power tool and an attachment portion integral with the battery. The attachment portion is configured to engage the battery receiving portion. The battery release mechanism also includes a closure member that is operable with and transversely disposed within the battery receiving portion. The closure member is configured to secure the battery within the battery receiving portion when the closure member is in a "lock" position. The closure member has a first end and a second end opposite the first end. The first end is disposed through a side wall of the tool housing and defines a push button for selectively moving the closure member from the "lock" position to a "release" position. When the closure member is in the "release" position, the battery can be removed from the power tool. A method of releasably securing a battery to a power tool is also disclosed.

15

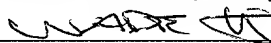
CERTIFICATE UNDER 37 CFR 1.10:	
"Express Mail" mailing label number:	EL544514436US
Date of Deposit:	May 24, 2000
I hereby certify that this paper or fee is being deposited with the U.S. Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to BOX PATENT APPLICATION, Assistant Commissioner for Patents, Washington, D.C. 20231.	
By:	
Name:	Wade Klingseisen

FIG. 1

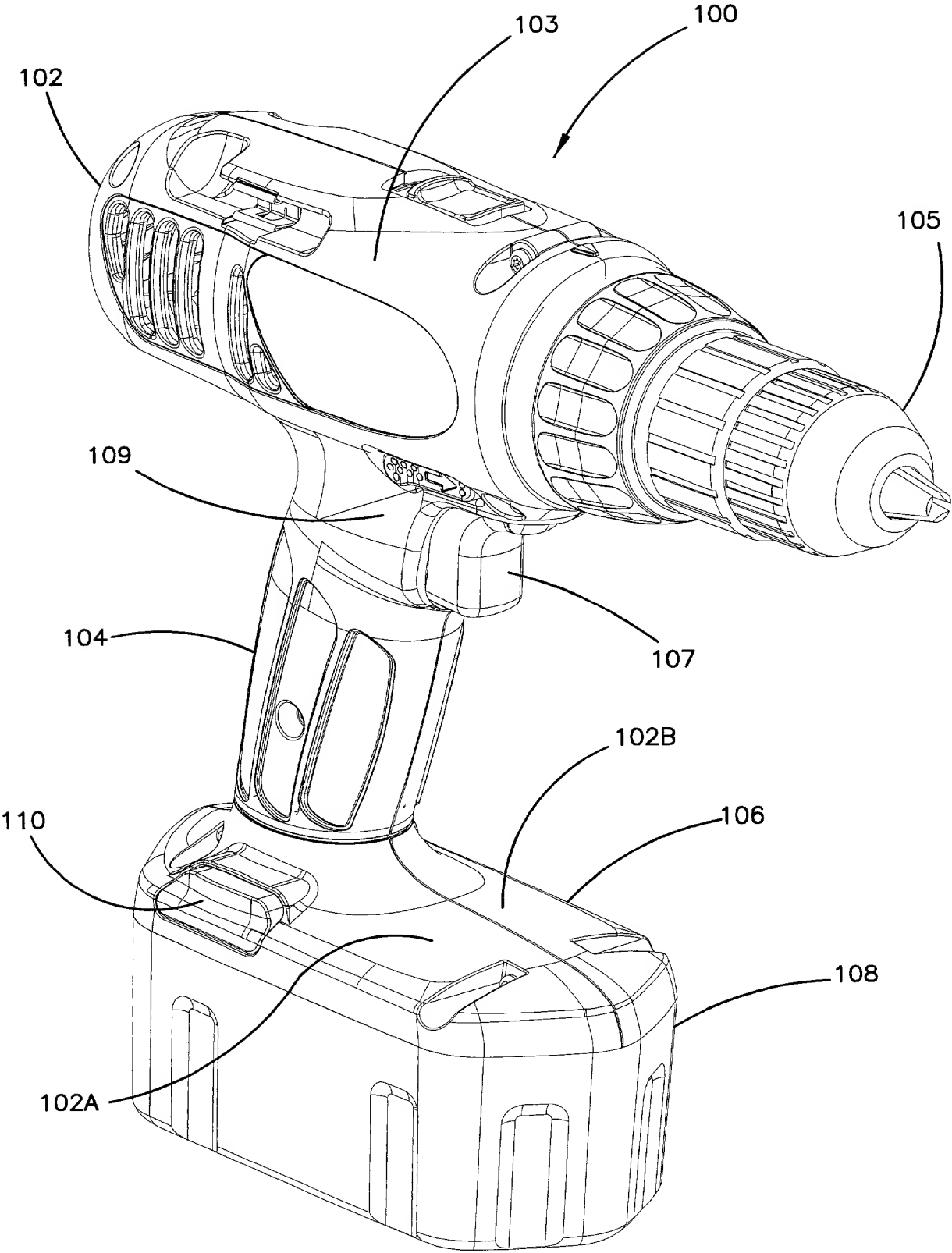


FIG. 3

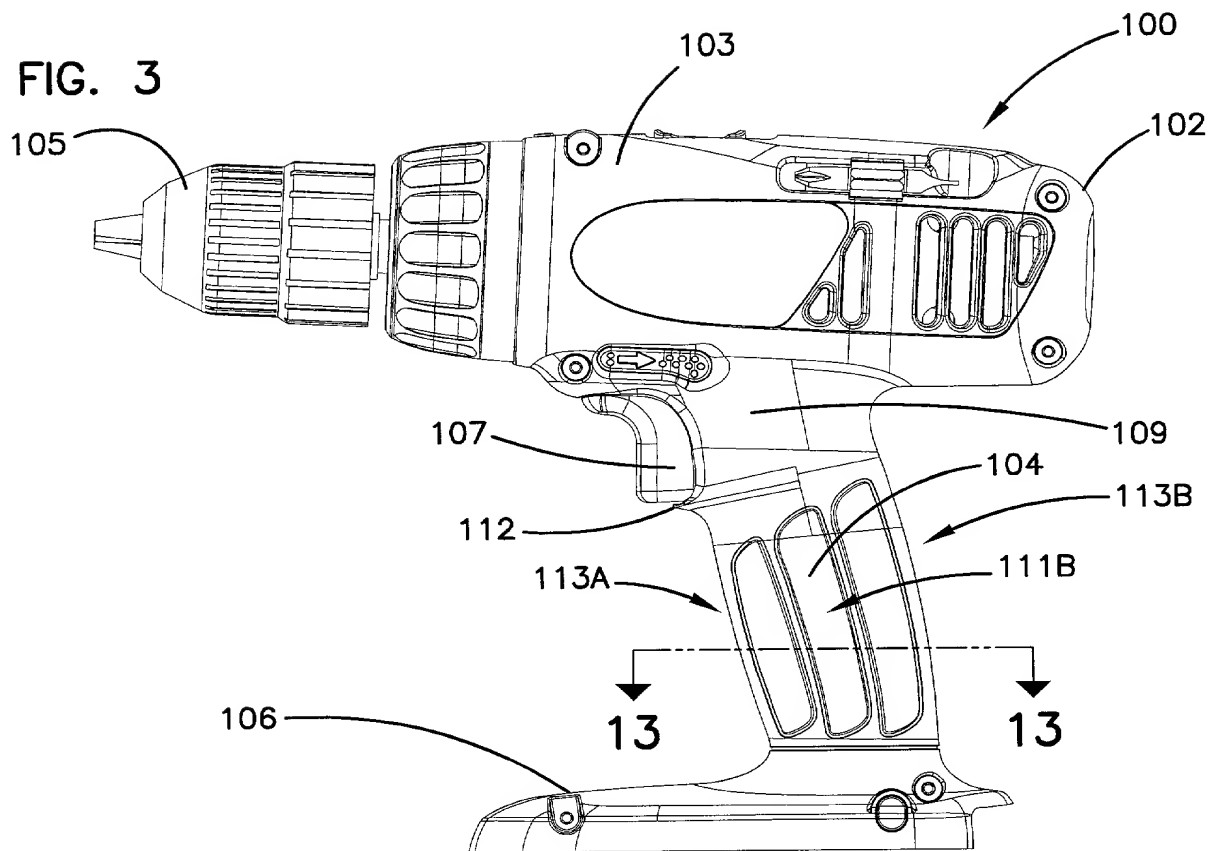
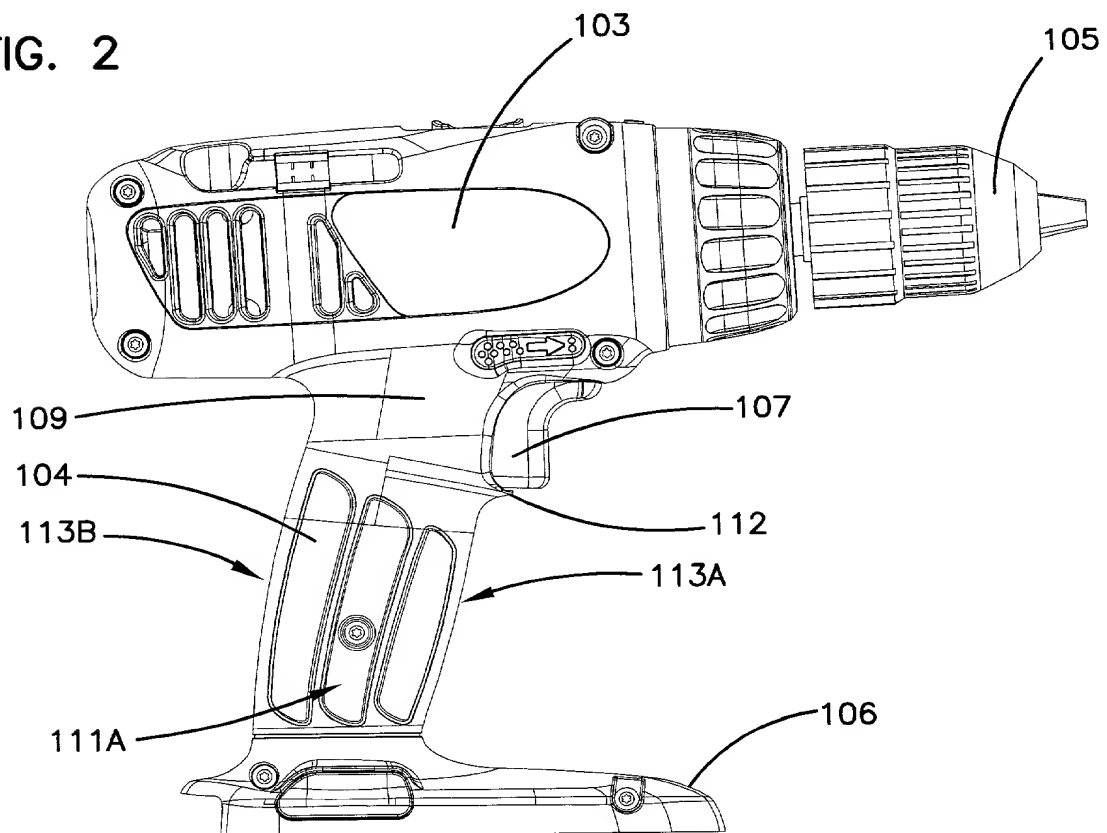


FIG. 2



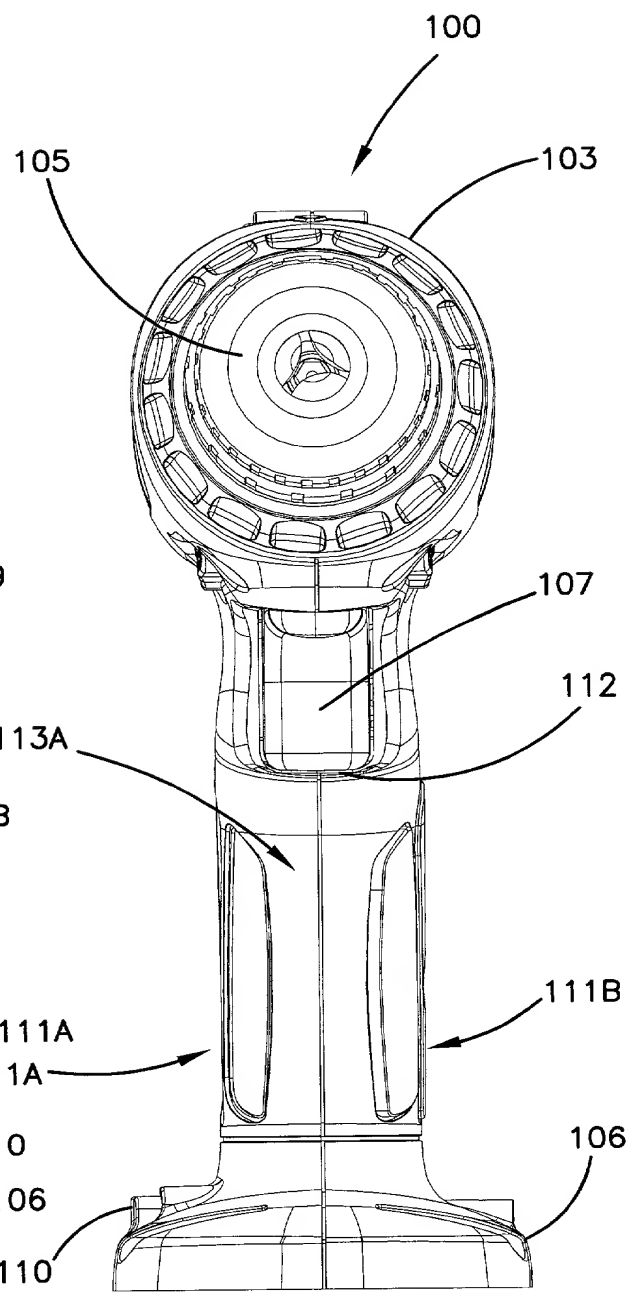
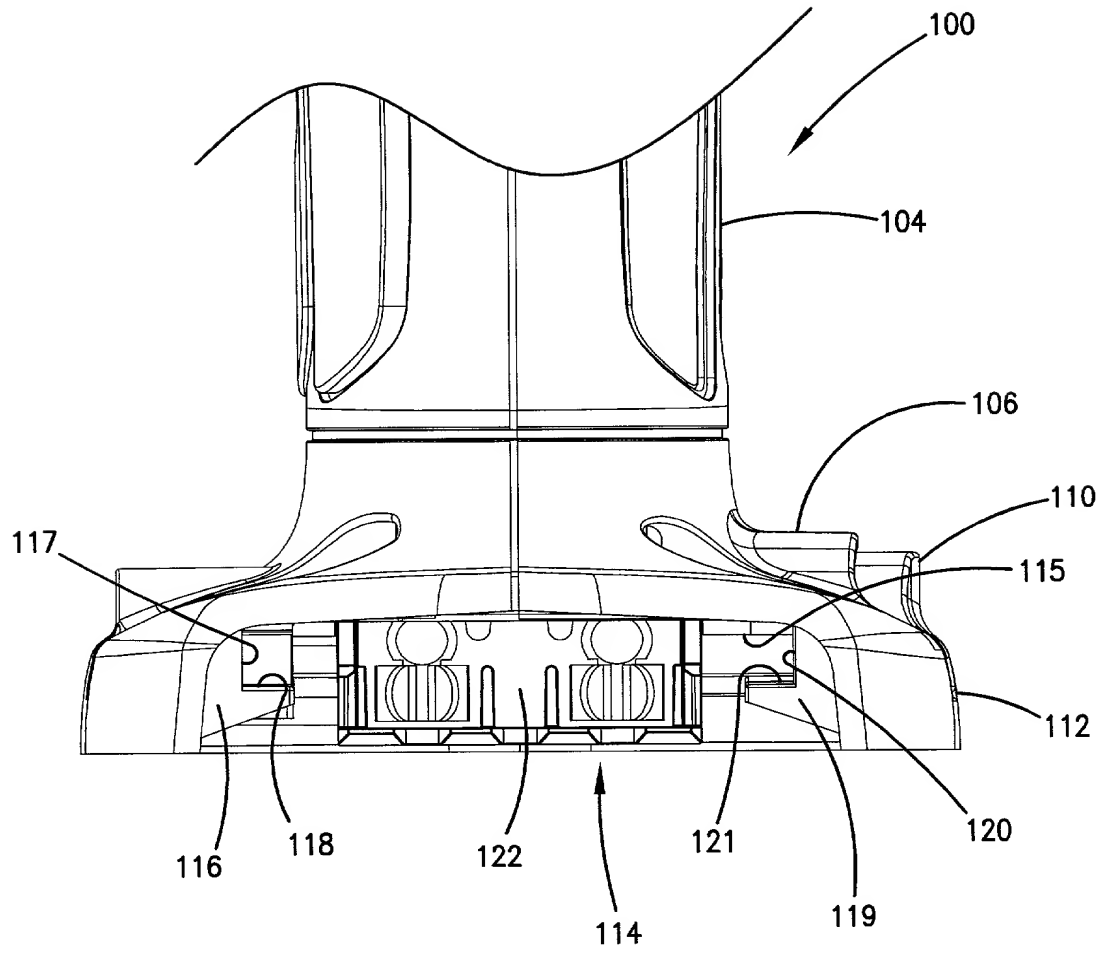


FIG. 6



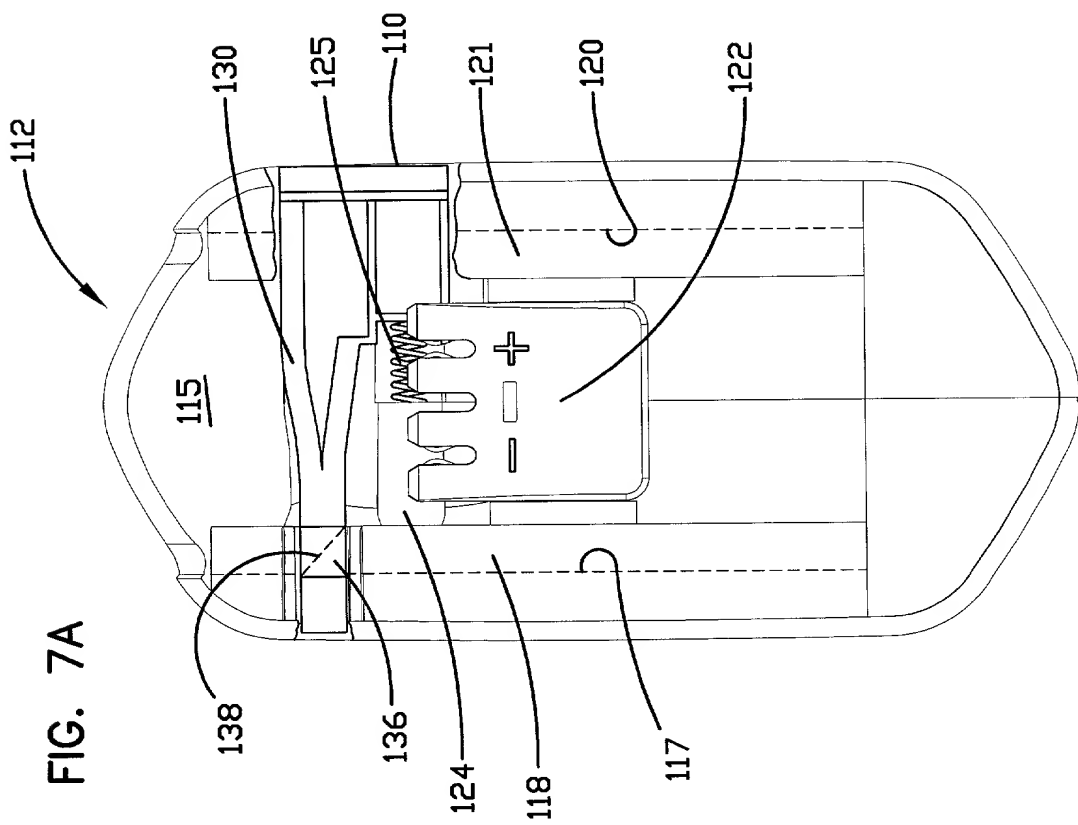


FIG. 7A

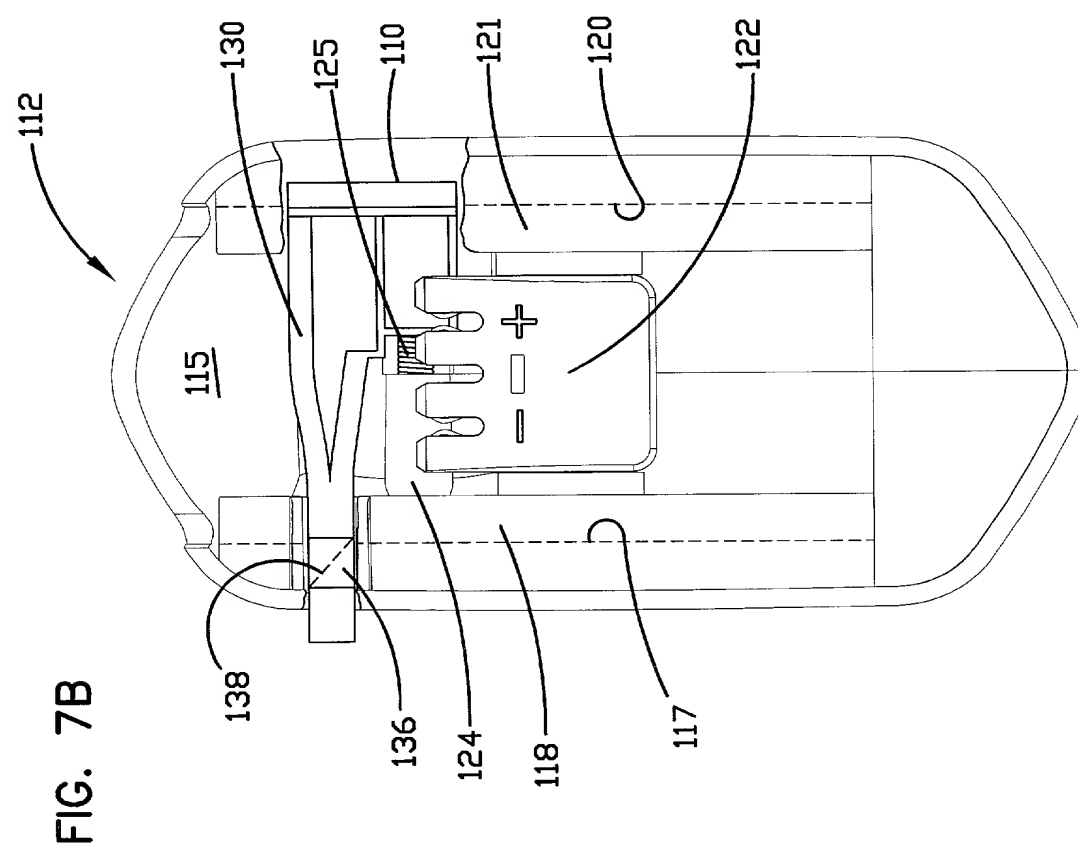


FIG. 7B

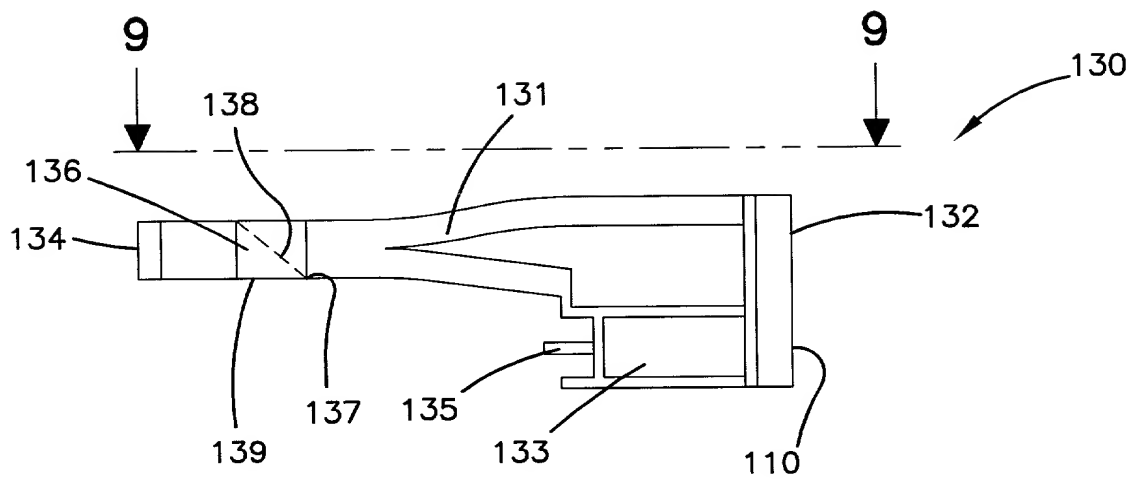


FIG. 8

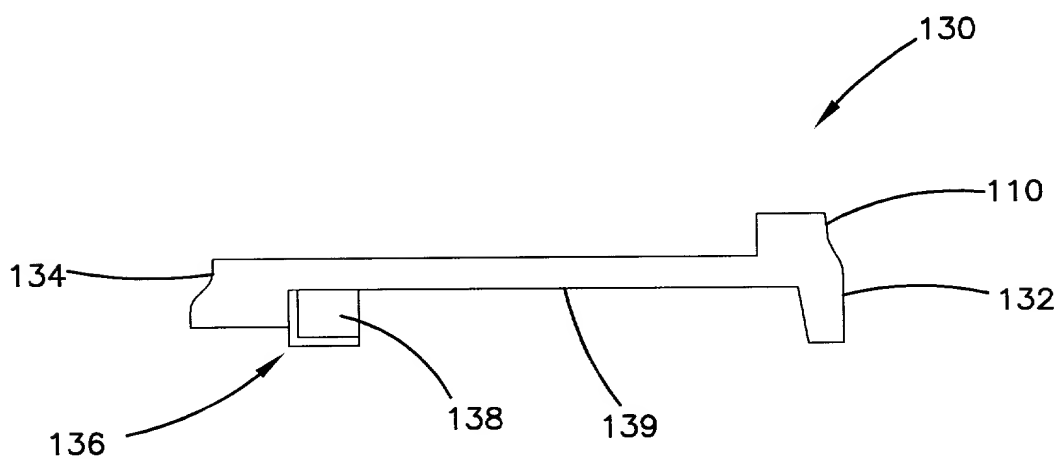


FIG. 9

FIG. 10

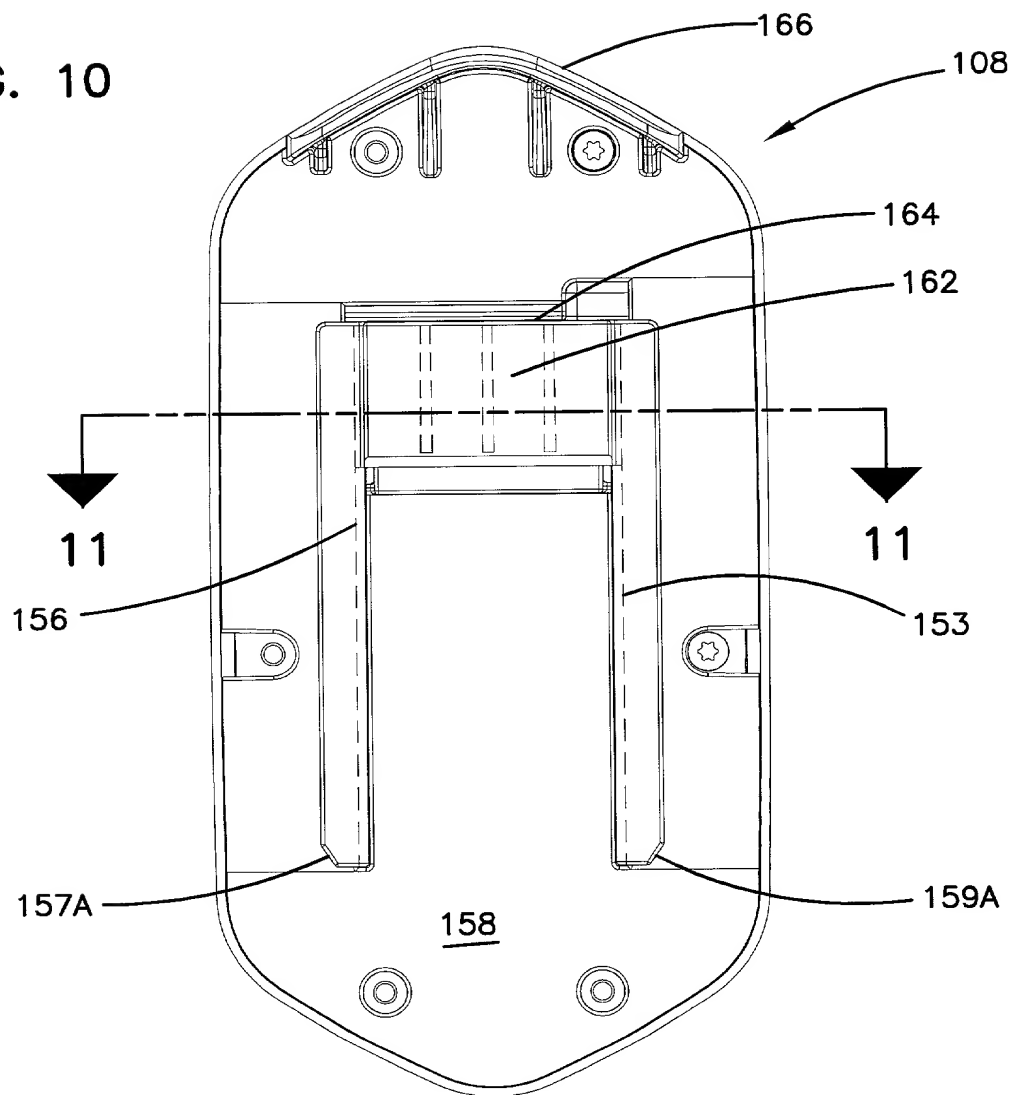


FIG. 11

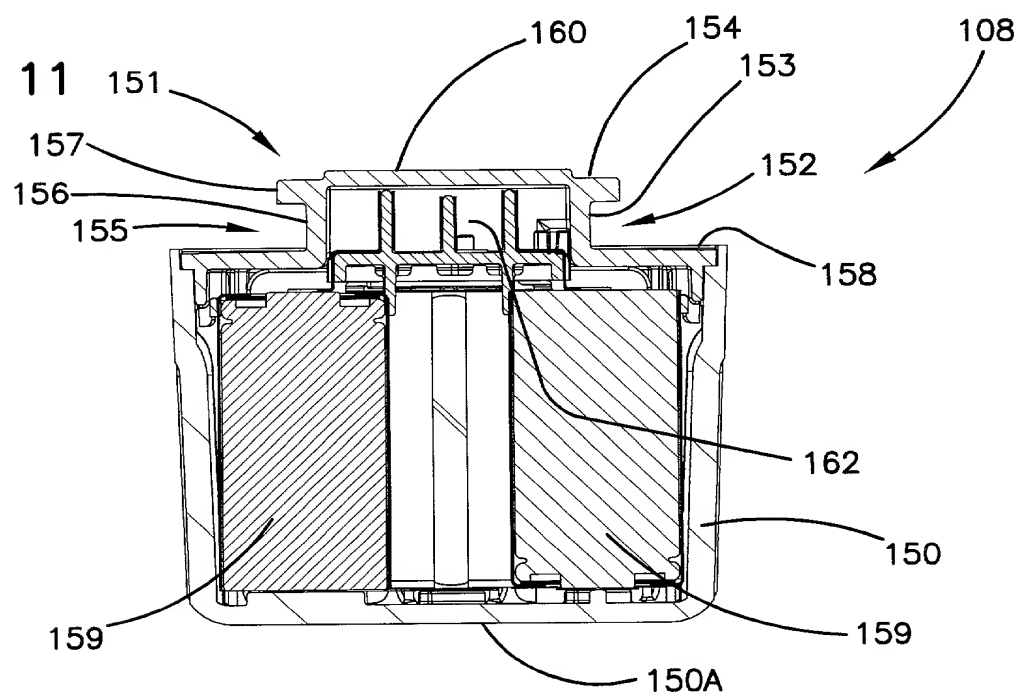
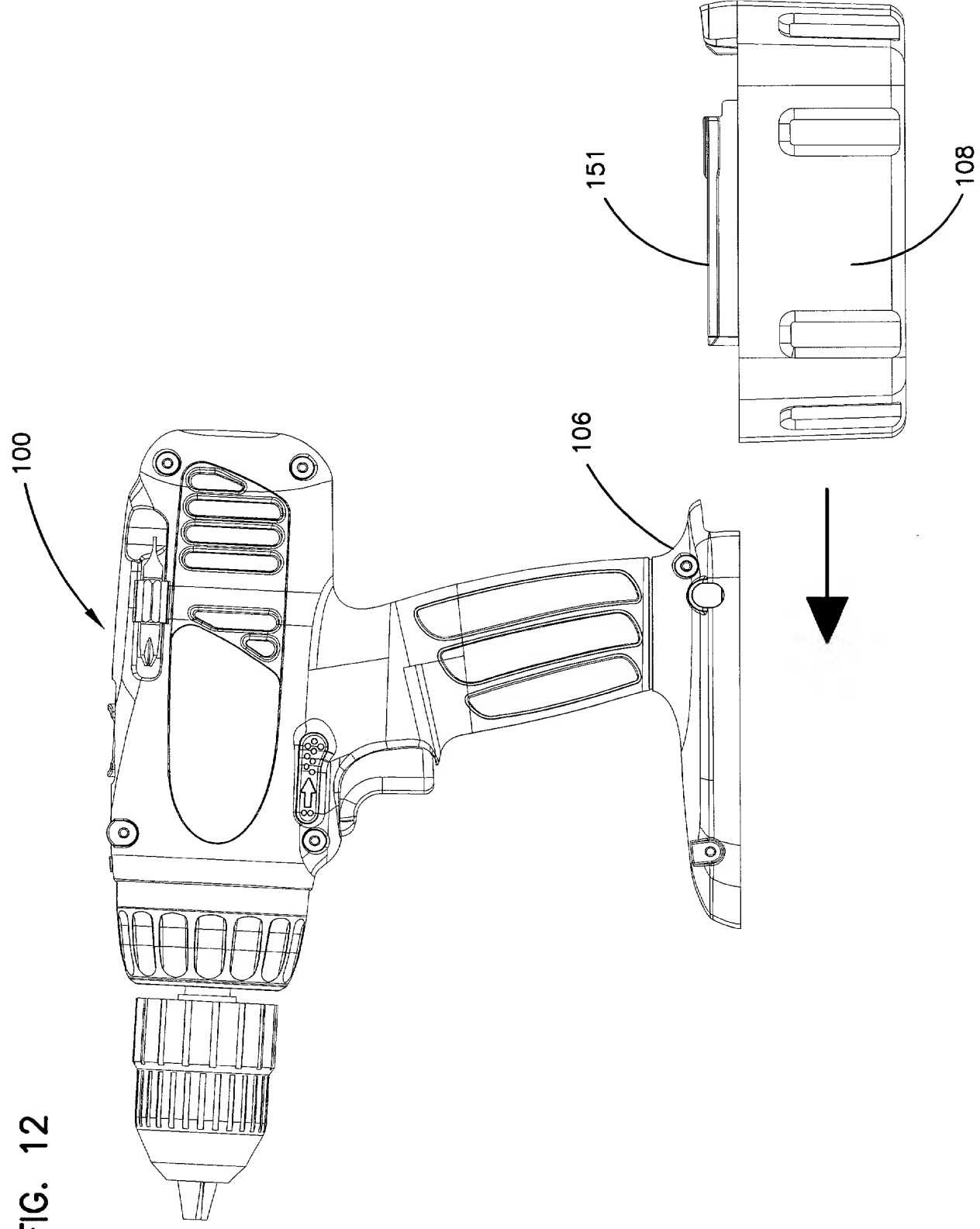


FIG. 12



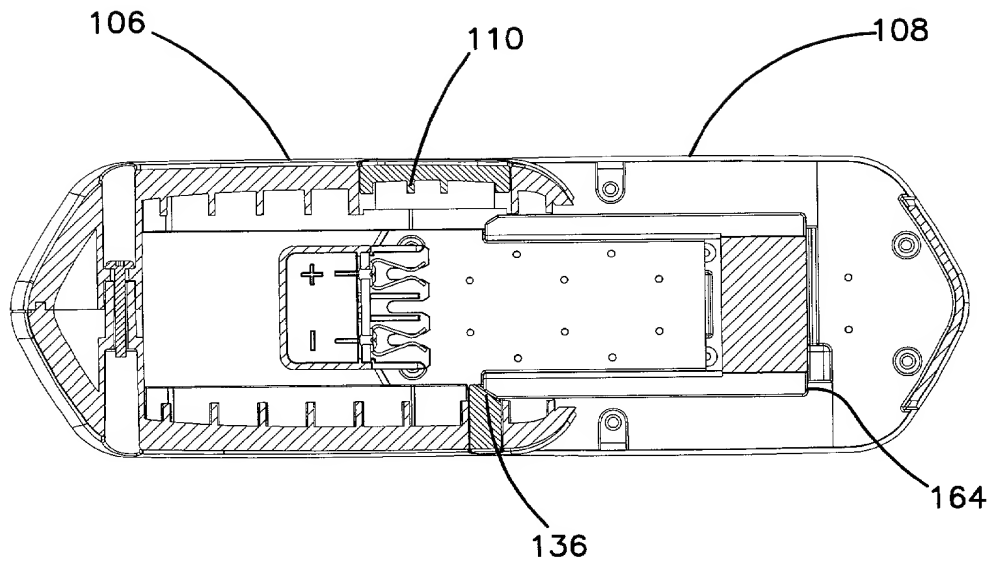


FIG. 13A

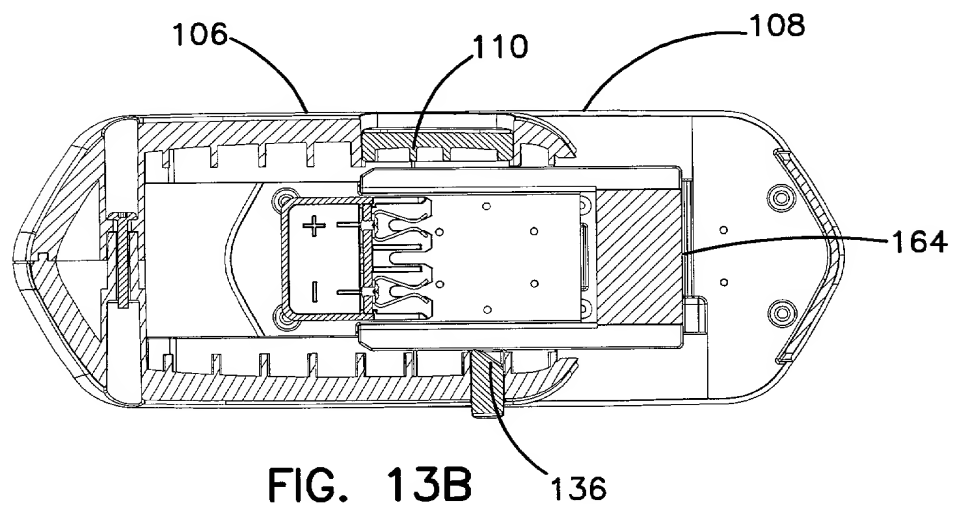


FIG. 13B

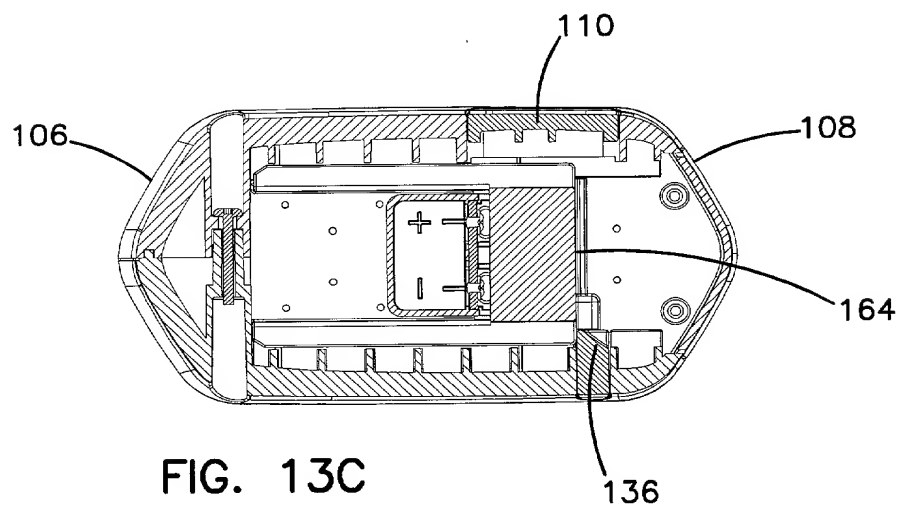


FIG. 13C

MERCHANT & GOULD P.C.

United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: CORDLESS POWER TOOL BATTERY RELEASE MECHANISM

The specification of which

- a. ☒ is attached hereto
b. ☐ was filed on as application serial no. and was amended on (if applicable) (in the case of a PCT-filed application) described and claimed in international no. filed and as amended on (if any), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56 (attached hereto).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

- a. ☒ no such applications have been filed.
b. ☐ such applications have been filed as follows:

FOREIGN APPLICATION(S), IF ANY, CLAIMING PRIORITY UNDER 35 USC § 119			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
ALL FOREIGN APPLICATION(S), IF ANY, FILED BEFORE THE PRIORITY APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)

I hereby claim the benefit under Title 35, United States Code, § 120/365 of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. APPLICATION NUMBER	DATE OF FILING (day, month, year)	STATUS (patented, pending, abandoned)

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

U.S. PROVISIONAL APPLICATION NUMBER	DATE OF FILING (Day, Month, Year)

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

Albrecht, John W.	Reg. No. 40,481	Lacy, Paul E.	Reg. No. 38,946
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Batzli, Brian H.	Reg. No. 32,960	Liepa, Mara E.	Reg. No. 40,066
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Branch, John W.	Reg. No. 41,633	McDonald, Daniel W.	Reg. No. 32,044
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Glance, Robert J.	Reg. No. 40,620	Spellman, Steven J.	Reg. No. 45,124
Goggin, Matthew J.	Reg. No. 44,125	Stoll-DeBell, Kirstin L.	Reg. No. 43,164
Golla, Charles E.	Reg. No. 26,896	Sumner, John P.	Reg. No. 29,114
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Gould, John D.	Reg. No. 18,223	Tellekson, David K.	Reg. No. 32,314
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Gresens, John J.	Reg. No. 33,112	Underhill, Albert L.	Reg. No. 27,403
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Hillson, Randall A.	Reg. No. 31,838	Wahl, John R.	Reg. No. 33,044
Holzer, Jr., Richard J.	Reg. No. 42,668	Weaver, Karrie G.	Reg. No. 43,245
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Karjeker, Shaukat	Reg. No. 34,049	Wickhem, J. Scot	Reg. No. 41,376
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Kettelberger, Denise	Reg. No. 33,924	Witt, Jonelle	Reg. No. 41,980
Keys, Jeramie J.	Reg. No. 42,724	Wu, Tong	Reg. No. 43,361
Knearl, Homer L.	Reg. No. 21,197	Xu, Min S.	Reg. No. 39,536
Kowalchyk, Alan W.	Reg. No. 31,535	Zeuli, Anthony R.	Reg. No. 45,255
Kowalchyk, Katherine M.	Reg. No. 36,848		

I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct Merchant & Gould P.C. to the contrary.

Please direct all correspondence in this case to Merchant & Gould P.C. at the address indicated below:

Merchant & Gould P.C.
P.O. Box 2903
Minneapolis, MN 55402-0903

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Signature of Inventor 204:			Date:	
205	Full Name Of Inventor	Family Name LAGALY	First Given Name MICHAEL	Second Given Name
	Residence & Citizenship	City JACKSON	State or Foreign Country TENNESSEE	Country of Citizenship USA
	Post Office Address	Post Office Address 173 REYNOLDS DRIVE	City JACKSON	State & Zip Code/Country TENNESSEE 38305-1561/USA
Signature of Inventor 205:			Date:	

§ 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)–(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) prior art cited in search reports of a foreign patent office in a counterpart application, and

(2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim;

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1) Each inventor named in the application:

(2) Each attorney or agent who prepares or prosecutes the application; and

(3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.